Alignment of Performance Metrics in a Multi-Enterprise Agribusiness: A Case of Integrated Autonomy?

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Abstract

Purpose - To examine the disconnect that can develop between corporate goals and those of individual intra-organisational business units arranged as an internal supply chain within a large vertically integrated agribusiness. To explore and discuss the development of a holistic performance metrics system that facilitates internal supply chain coordination and cohesion while allowing synergies to develop across the company.

Design/methodology/approach - A case study approach involving a participative action research component was used to examine the disconnect between internal business unit (operational) goals and overall corporate (strategic) goals and to develop a conceptual performance assessment model addressing both operational and strategic contexts.

Findings - The findings show that appropriate performance indicators and measures can be created that relate directly to logical operational outcomes thus encouraging a more tightly integrated internal supply chain, a stronger coherence among the components and a better aligned set of operational and corporate goals.

Research limitations/implications - Only financial information and data obtained from a participative managerial decision making simulation were used to explore performance goal incongruence between operational and corporate managers, compared to the need for multiple contextual performance measurement metrics that the literature suggest provides a best practice system.

Originality/value – The rapidly developing corporate agribusiness sector provides a unique operating environment in that these companies deal primarily in self regenerating assets such as livestock. Additionally we explore for the first time the development of performance metrics for

improving the coordinated integration of autonomous business units and suggest the concept of ‘Integrated Autonomy’ as a way to describe the resulting situation.

Keywords: Case study; Agribusiness; Internal Supply Chain; Performance Measurement; Goal Alignment, Integrated Autonomy.

1. Background

Performance measurement is the process of developing measurable indicators that can be systematically tracked to assess progress made in achieving predetermined goals (GAO). Measures are a quantifiable metric of results (i.e. number of dollars saved, number of days saved in a business process, or recorded improvement in customer satisfaction) and have traditionally centred on the main performance areas of a company - financial, operational, or functional efficiency (Otley, 1999, Hongren, Foster and Datar, 1999). Such metrics have been used for many years in business (Govindarajan and Gupta, 1985; Scott and Tiessen, 1999; Abernethy, Bouwens and van Lent, 2003; Davis and Albright, 2004; Simons, 2005), and tend to be derived from operational accounting and information systems.

From a supply chain perspective, given that such chains are recognised as multiagent complex systems which require a large number of performance measures to accurately characterise the system (Swaminithan et al., 1998, Beamon, 1999) functional metrics have been criticised as being unholistic (Caplice and Sheffi, 1995) and limited by their internal business focus rather than business boundary spanning characteristics (Kiefer and Novak, 1998; Tan et al., 1999). Lee and Amaral (2002) go further and suggest that functional metrics in fact actually promote locally optimised 'silo' behaviour and that they can be 'tinkered' with by experienced managers to make themselves look good. Additionally, Merchant and Van der Stede (2003) and Harrison and Godsell (2003) indicate that since such metrics report past activity rather than provide and insight into the future, they have major limitations for supply chain performance measurement which requires a cross functional dynamic performance management system incorporating a way of measuring forecasting success and associated customer service.

The discussion in the literature on this point is that most of these 'standard' business metrics have come out of management research and do not address operational metric development, implementation or use, in a logistics or supply chain environment (Melnyk et al., 2004). Similarly, Griffis et al. (2004) query the quality of current logistics performance measurement systems suggesting that while research into methods to improve logistics performance has resulted in benefits to the firm, similar improvements in performance measurement have not necessarily followed. They go on to suggest that more research needs to be undertaken on the information reporting needs of individual firms in order for them to create acceptable and useful measures -their reasoning being that disconnects between measurement needs and measure choice can occur when poor information is used as metrics or when the metrics used are chosen without regard for the

actual needs of the company. This latter issue is particularly so in firms with unique operating environments or strategies (Swamidass, et al, 2001).

The study outlined in this paper examines the disconnect that can develop between overall corporate goals and those of individual intra-organisational business units - even in a firm regarded as 'successful' by standard business measures - through a case study of the performance measurement arrangements of the internal supply chain of a large corporately owned agribusiness in Australia.

Agribusinesses (those companies in the agricultural input sector, the production sector, and the food and fibre processing-manufacturing sector), tend to deal in low margin commodities where competitive market forces have typically resulted in the cost of production being very close to the value created, thus leaving relatively thin profit margins (Boehlje, 1999; Rickets and Rawlins, 2001, Bryceson, 2006). Additionally, raw material production is directly affected by climate and the resulting uncertain weather conditions which very often results in a variable supply of the raw product. Ensuring constant volume, high quality product at the right time and price is thus a key business consideration and involves rigorous supply chain management (SCM) both within the company and between businesses in the industry supply chain (O'Keeffe, 1998; Dunne, 2001, Bryceson & Kandampully, 2004).

In the agri-food sector, supply chains are generally set up within industry sectors – examples include the grains, red meat, lamb, pork, dairy, horticulture industry sectors etc - and are set up to facilitate efficient links between producers, processors and retailers. The effectiveness of these industry chains will depend on how well their activities integrate and coordinate to create efficiency and value at each link of the chain as well as the value created for final consumers (Porter,1985). Fig.1. illustrates the links in an Australian grains industry chain.

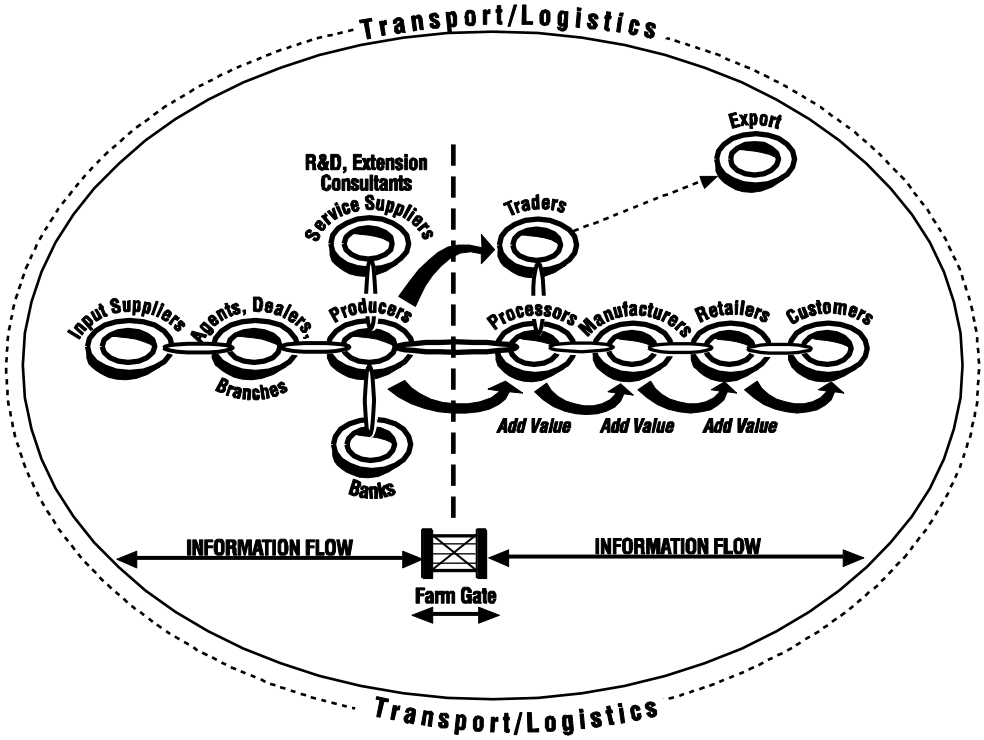

Fig. 1. A generic Australian wheat industry chain [Source: Bryceson and Pritchard, 2003]

As with other industry sectors, SCM decisions in the agri-food industry are both strategic and operational (Sabri and Beamon, 2000). *Strategic decisions* are normally made over a long time horizon and they guide supply chain policies from a design perspective. *Operational decisions* are short term, and focus on activities over a day-to-day basis. Both types of decisions attempt to create a situation that effectively and efficiently manages the logistics associated with product flow in the strategically planned supply chain. Good supply chain management integrates user expectations, commercial requirements, and the flow of purchased materials and services: it rewards shareholders by enhancing profitability and providing better returns (Beamon and Bermudo, 2000; Hausman, 2002). However,the measurement of "good" supply chain management needs to be reflected in performance metrics that address the resources involved, outputs created and overall system flexibility (Beamon, 1999; Chan et al 2003; Chan & Qi, 2003; Power, 2005; Theeranuphattana & Tang, 2008).

Underlying an industry supply chain, are the individual business's internal supply chains. These can be defined as the flow of raw product through various internal sections of the business to create the final saleable product that is passed onto the customer – normally the next component in the industry supply chain (Krajewski and Ritzman, 1993; Shah and Singh, 2001). Thus the internal supply chain comprises the internal business units that add value to products as they progress

through a vertically integrated organisation. Like industry supply chains, the success of an internal supply chain depends on integration, coordination, communication and cooperation (Shah and Singh, 2001; Lee and Amaral, 2002;), and appropriate performance measurement and management is essential if the business is to attain a return on investment (Simons, 2000). However, one of the key issues faced by internal supply chains is the tendency to have a disconnect between the goals of each component in the supply chain and the overall business goals (Huin et al, 2002) because each component is very often an autonomous business unit or profit centre.

The study described in this paper investigated the disconnect between corporate goals and those of autonomous intra-organisational business units arranged as an internal supply chain of a large vertically integrated corporate agribusiness. The project was undertaken as a result of senior managers in the agribusiness involved (a large multienterprise beef production enterprise) recognising that managers of the individual business units (properties/farms) comprising the internal supply chain of the company, were managing resources from an individual operational property perspective rather than addressing overall corporate goals. The explicit risk associated with this identified goal incongruence was lower overall profitability which in turn compromised the company's targeted growth strategy.

The results of the initial investigation indicated that existing business information flows and performance metrics did indeed promote a disconnect between corporate goals and those of autonomous intra-organisational business units, and that performance measures that facilitated an integrated autonomous condition would be useful. The issue for the company was then one of looking at a suitable performance measurement framework to create goal coherence across the organisation and thus a pathway to achieving a condition of integrated autonomy.

Neely et al (2000, 2005), reviewed performance measurement design in detail, and it is clear from these works that a framework based on a balanced scorecard approach underpinned by a participative input from company personnel would be a useful tool to investigate in order to address this need.

1.1 Balanced Scorecards as a framework to facilitate organisational goal coherence

Since the early 1990s, the main alternative to functional metrics based performance systems has been the development of balanced scorecards. Kaplan and Norton (1992, 1993), developed the original Balanced Scorecard (BSC) to provide company executives '*with a comprehensive framework to translate the company's strategic objectives into a coherent set of performance measures*' (Kaplan and Norton, 1993, p 134).

The BSC approach uses information from four main areas of business activity: the Customer, Finance, Internal Business Processes and Learning and Growth areas, in a structured arrangement of financial and non-financial measures designed around the strategic direction of the business. A critical concept of the BSC is that outcome measures and the performance drivers of those outcomes should be linked together in terms of cause-and-effect relationships (Reisinger et al, 2003).

While there is no doubt that the BSC is a solid performance management system and has been successfully implemented in many businesses worldwide, the theory of a cause and effect relationship between outcome measures and the performance drivers has recently been questioned. Norreklit (2000) argues that it is more useful to develop measures based on *logical* relationships that facilitate coherence, rather than cause and effect relationships, while Plummer and Rolfe (2002) point out that using logical relationships enables the components of various business areas to be easily integrated allowing the goals of the overall business to be achieved through *synergies* between components rather than by looking for a causal structure which may either be forced, or may not exist at all (Mentzer, 2004). These arguments against the standard BSC framework are particularly relevant from a supply chain perspective where there has been much work in recent years on the development of integrated supply chain frameworks where synergies between chain components are fundamental for success (Cox, 1999; Dunne, 2001; Tan, 2002; Vickery et al., 2003; Bryceson and Kandampully, 2004; Vereeke and Muylle, 2006).

The use of the BSC approach in supply chain management has been explored by Brewer and Speh (2000; 2001) and by Brewer (2002). These authors argue that very few firms have incorporated the BSC into their supply chain management and present the case for adapting the BSC to create a generic performance measurement framework for supply chains. While they give no specific examples relating to agribusiness supply chains, some general examples of the types of measures that fit within a combined BSC and supply chain management performance framework are discussed and are depicted in Fig. 4. They conclude that while the BSC approach is not specifically designed for supply chain management, it does give good guidance for the selection of key performance indicators that are based on synergistic relationships (Brewer and Speh, 2000; p91).

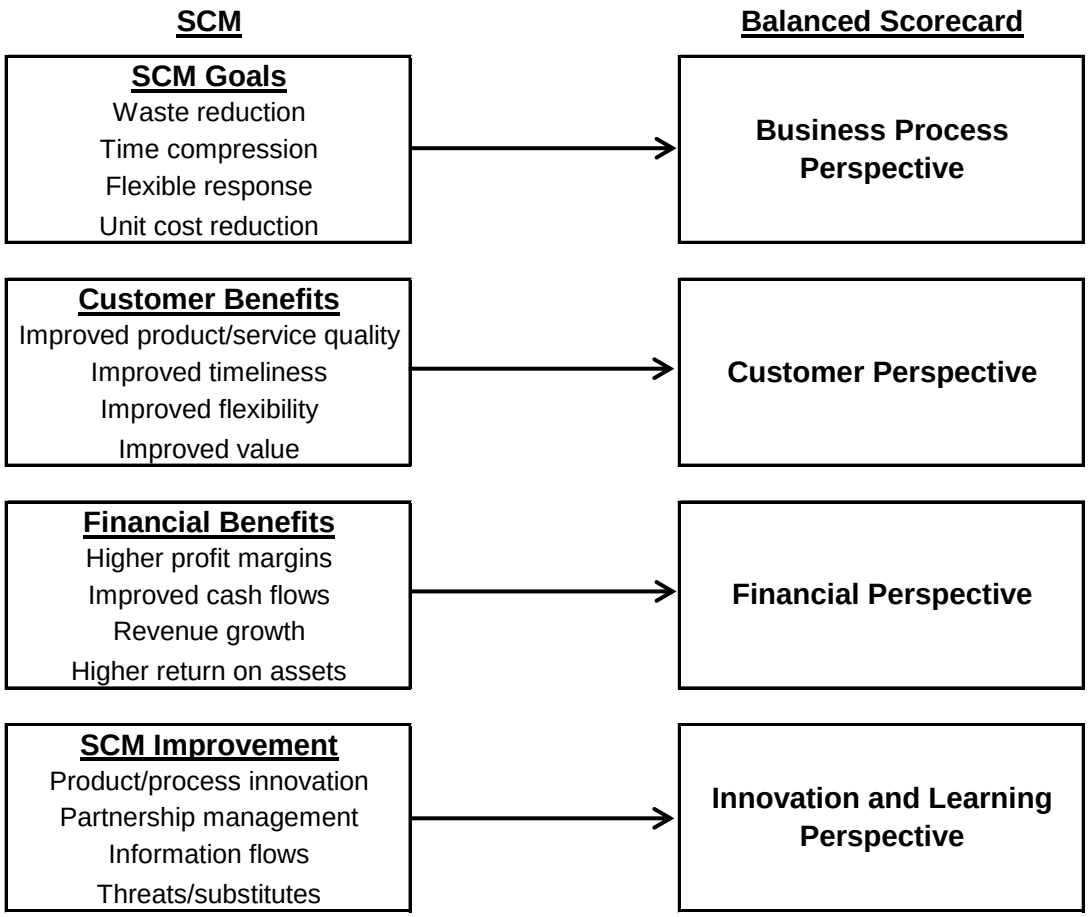

Fig. 4. The relationships linking supply chain management to the BSC Framework [Source: Brewer and Speh, 2000 p. 85]

In contrast, Lee and Amaral (2002) outline a number of limitations of BSC frameworks which include the fact that most BSC systems are simply static management dashboards, highly weighted by financial information with much important non-financial data and qualitative information not being captured or synthesised. Moreover these authors indicate that BSCs do not track decisions and their effectiveness over time, so making it difficult for organisations to improve by learning from experience – a key component for developing core competencies (OECD, 2005) and a key requirement of the company described in the case study.

Given the established nature of balanced scorecards and the recent literature criticising them, further research needs to done to either: (i) identify groups of supply chain measures that fit within the BSC framework, or alternatively, (ii) identify a framework that can incorporate both operational and corporate objectives with associated key measures. Implicit in both research issues is the need for firms to develop customised measures that support their strategic supply chain objectives. As the

literature outlined in this paper has indicated, this is particularly the case for agri-industry chain analysis where very little in this area has been reported on.

As a result, it was decided to create a hybrid performance measurement system to deliver better alignment of corporate and operational goals by defining some key metrics or indicators that could be incorporated into a framework derived from a BSC that facilitated the condition of Integrated Autonomy.

2. Company Background and Management

Like many of the larger agribusinesses within the cattle industry in Australia, ACGC (*the company involved has requested anonymity and is thus referred to as ACGC throughout the remainder of this paper*), is a multi-enterprise business. That is, the company comprises a number of different operational business units that are either supplied by, or supply, another component within the company to form an *internal* supply chain. Each operational business unit is an independent property run by a property manager and associated staff. Each property has its own individual operational budget and is regarded as a profit centre - although all properties are expected to contribute to the overall profitability of the company as their first priority.

As can be seen in Fig. 2, the organisational structure of ACGC is a traditional one. The corporate management team includes a chief executive officer supported by senior managers in areas relating to livestock, marketing and finance. At the operational level - property managers have similar responsibilities to divisional managers in large urban based organisations ensuring that their component of the overall enterprise runs efficiently and profitably.

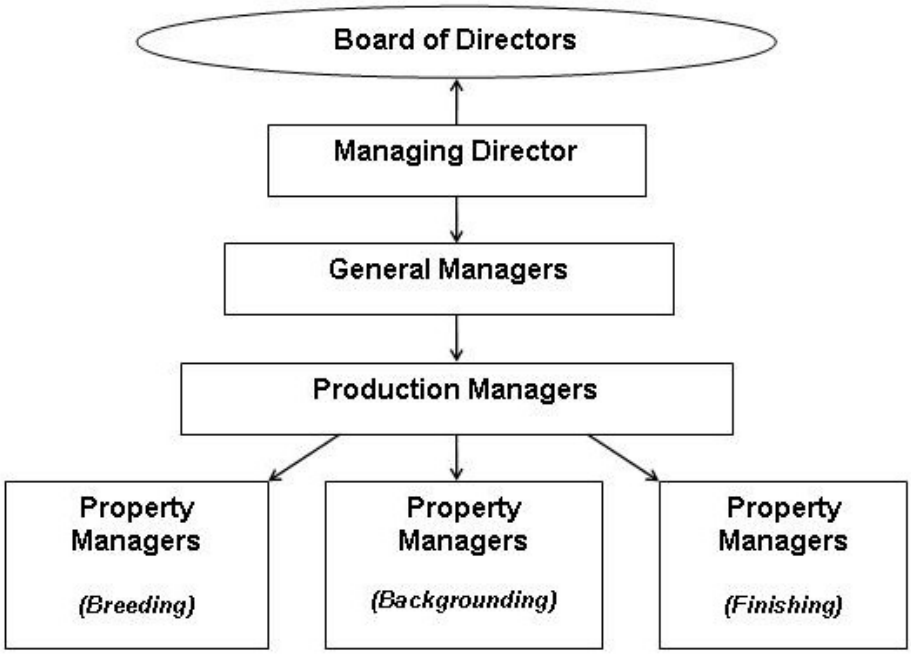

Fig. 2. Organisational structure of ACGC and company information flows.

2.1 Internal Supply Chain.

ACGC currently has a number of properties across northern and eastern Australia which span the operational cattle production areas of breeding, backgrounding and finishing. The internal supply chain of ACGC (Fig. 3) therefore consists of:

1. Breeding Properties
2. Backgrounding Properties
3. Finishing Properties

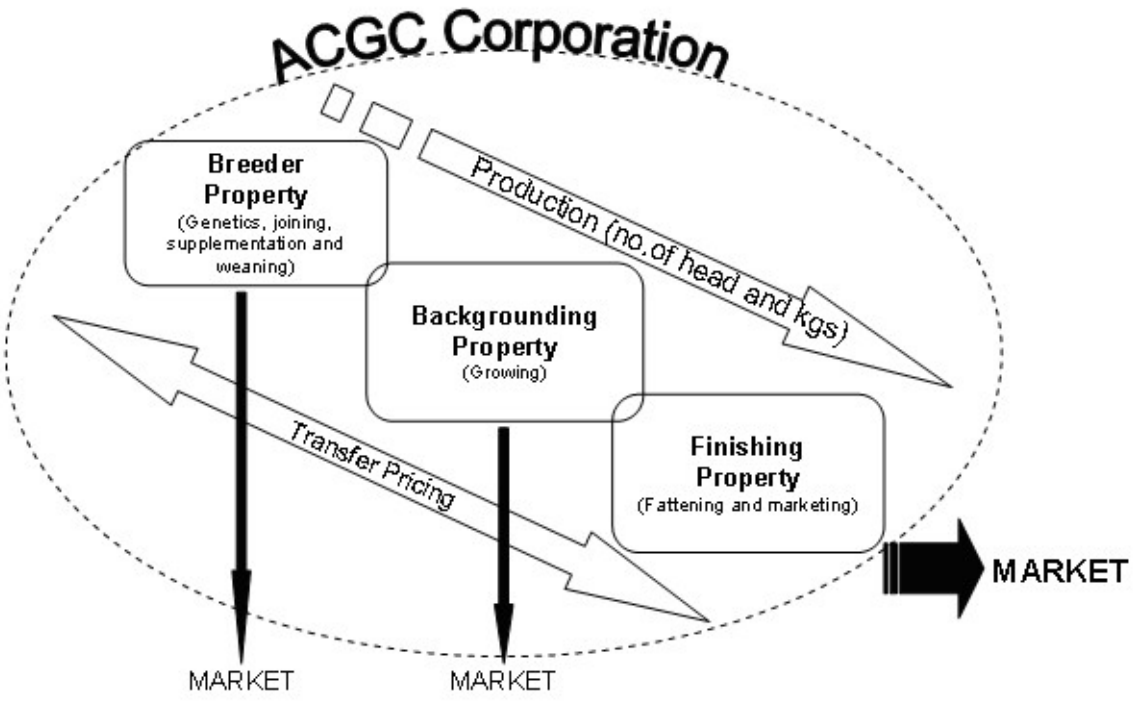

Fig. 3. The internal supply chain of ACGC – an integrated Australian beef producer.

The internal supply chain includes the physical flow of goods and the associated management accounting information flows that are required for raw materials to be transformed into finished products within the overall company (Fisher, 1994; van Helden, van der Meer-Kooistra and Scapens, 2001; Christie, Joye and Watts, 2003; Kaplan and Norton, 2004; Simons, 2005). A major component of the accounting information flow in ACGC is that associated with transfer pricing between operational units (Fig. 3) which is used within the organisation as a proxy for market prices of cattle when transferring product (cattle) from one part of the internal supply chain to the next.

3. The Study

3.1 Approach

A case study approach was used in order to in examine the disconnect between internal business unit goals and overall corporate goals - i.e to 'investigate a contemporary phenomenon within a real life context' (Yin, 1994), and to develop a performance measurement and management system which could be discussed in the context of both financial and performance management / measurement literature.

3.2 Methods

An investigation of the relevant agribusiness supply chain, management accounting and performance measurement literature formed the contextual background to an exploratory qualitative analysis of the monthly internal company financial report which was provided by ACGC. Semi-structured discussions with the Chief Financial Officer and General Manager (Production) of ACGC were used to clarify any information in the report that was required.

This was then followed by a participative action research stage focused on data gathering from the company's nine operational managers. A business simulation model was developed which enabled a quantification of financial impacts across the company associated with the relationship between the information operational managers were provided with and:

- their operational activities relating to specific production issues for each type of property (Breeder, Backgrounder, Finisher);
- what prompted the decisions associated with those activities; and
- how such decisions related to operational or corporate management goals.

The aim of the simulation was to demonstrate the flow-on effects of individual management decisions from one property to another, (*e.g. what is the production management impact and/or the financial impact of a decision made by a Breeder on a Backgrounder?..etc),* and how decisions made throughout the internal chain affect the bottom line of the whole company.

The simulation model allowed the person running it to make decisions at each stage of the internal supply chain and was run a number of times by each of the nine company operational managers. The decisions made by each manager were logged and the effects of those decisions - both on the property type being 'managed' in the simulation, and on the other properties (internal supply chain components), were traced and evaluated using some simple criteria e.g. weight (kg/head), numbers of animals, market price ($/kg) costs ($/kg) and time (days) to produce final weight. Each manager was also asked to keep a log of what information they used to make decisions and the reasons why decisions were made from their perspective.

Finally, a conceptual but clearly defined performance measurement system using corporate information that could provide a way to manage and minimise the incongruence between corporate and operational goals as identified, was developed and presented to senior management for their consideration and possible implementation.

4. Analysis

4.1 Existing Performance Measurement Information

Currently, business unit (i.e. property) performance in ACGC is measured largely against financial indicators reported in the company's management accounting system. A management accounting system is a business information system which provides information on a routine basis for costing goods, services and organisational units, and for budgeting systems and performance management, to assist managers in their planning and control activities (Langfield-Smith et al., 2003). Such systems should enable organisations to provide feedback to employees about actual costs efficiencies, quality and timeliness of their activities (Cooper and Kaplan, 1999). In ACGC the indicators normally being used are those that relate to the movement (transfer) of cattle from one property to another in the internal supply chain. Transfer prices received, and the ensuing profits or losses incurred at each stage of the internal supply chain provide an internal measure of revenues and expenses that replicate what would happen if cattle were bought and sold on the open market rather than transferred within the organisation.

Thus in the comprehensive monthly report that ACGC Head Office provides to property managers to help them keep track of their performance (of which the Tables 1 and 2 below are a part), **'***the inventory cost of transfers******' in Table 1 (Cattle Trading Account) is the valuation of the cattle based on market prices. Inventory costs less cartage equals the '*transfers margin******' which is treated as revenue on individual property records in Table 2, (Summary Profit and Loss statement for each property).

Table1. Example of a Cattle Trading Account *[components found as on actual ACGC Report. Figures are examples only]*.

Cattle Sales	**($000)**
Cattle sales	15,000
Less cartage on sales	(500)
Less feedlot costs	(1,000)
Less cost of sales	(8,000)
Total sales margin	**5,500**
Cattle Purchases	
Cattle purchases	(3,000)
Less cartage on purchases	(200)
Inventory cost of purchases	2,800
Total purchases margin	**(400)**
Cattle Transfers	
Less cartage on transfers	(750)
Cattle transfers	0
*Inventory costs of transfers**	1,400
Total transfers margin*	***650***
Herd Growth	
Natural increase	5,000
Deaths	(2,000)
Total herd growth	**3,000**
Cattle Revaluation	
Beast growth	7,000
Revaluation	2,500
Total revaluation	**9,500**
Total Cattle Trading	**18,250**

Total revenue for each property is the combined total of all the components in the cattle trading account shown in Table 1. For individual properties transfers *out* will be shown as *revenues* and transfers *in* as a *cost*. When cattle are transferred from breeding to backgrounding to finishing properties, it is only the actual costs incurred in production that are important at the time of sale on the open market. In other words in theory, each manager's focus at each stage of the internal supply chain should always be on the end game which is the final sale and the associated cost of producing the product. That is, actual total cattle trading less variable and fixed costs of production dictates the profitability of the overall organisation (Table 2).

Table 2. Example of Summary Profit and Loss Statement for each Property [*components found as on actual ACGC Report. Figures are examples only]*.

Cattle Revenues ($000)	**Property 1**	**Property 2**	**Property 3**	**Total**
Sales margin	1,222	2,444	1,650	5,500
Purchases margin	(89)	(178)	(133)	(400)
Transfers margin	144	289	217	650
Herd growth	667	1,333	1,000	3,000
Revaluation	2,111	4,222	3,167	9,500
Total Cattle Trading	**4,056**	**8,111**	**5,900**	**18,250**
Expenses ($000)				
Labour	(425)	(850)	(213)	(1,488)
Cattle	(310)	(620)	(155)	(1,085)
Stud	(125)	(250)	(63)	(438)
Pastures	(225)	(450)	(113)	(788)
Fuel and oil	(35)	(70)	(18)	(123)
Rates	(65)	(130)	(33)	(228)
Professional & legal fees	(40)	(80)	(20)	(140)
Administration	(45)	(90)	(23)	(158)
Management fees	-	-	-	-
Interest	-	-	-	-
Repairs and maintenance	(125)	(250)	(63)	(438)
Depreciation	(95)	(190)	(48)	(333)
Total Expenses	**(1,490)**	**(2,980)**	**(745)**	**(5,215)**
Net profit/loss before tax	**2,566**	**5,131**	**5,155**	**12,852**

In practice, given the fact that properties are regarded as profit centres, the use of transfer pricing inevitably focuses the attention of property managers on the profitability of their individual enterprises. As a result, property managers are motivated to maximise the value of the cattle they produce in terms of transfer pricing arrangements to enhance the profitability of their individual property - rather than to focus on maximising growth (kg/produced) along the chain and reducing the overall time to market which would enhance overall corporate profitability. In addition, the information presented in the monthly company report does not combine operational measures with corporate financial measures in a way that is meaningful to operational managers given their level of accounting skills. For example - separating transfer pricing arrangements from the lagging indicators of actual sales and costs for each property as described above, is not intuitive to the average person without specialist accounting knowledge.

According to Gavious (1999) this response to transfer pricing arrangements is not unusual behaviour in decentralised organisations and inefficiencies in the internal supply chain that develop as a result, can be quite negative to the overall good. He infers that the use of transfer pricing as an internal performance measure may not best serve multi-enterprise organisations in the long term and that it would better serve the goal of corporate management, if the focus of property managers was on factors that they could influence such as production management which would then effect internal supply chain efficiencies.

4.2 Participative Action Research

The task for each property manager in running the simulation model was to manage production for the whole company herd (given specific criteria), and manage costs and returns for the whole herd in two different climatic scenarios: normal climatic conditions and in drought.

Semi-structured discussions were conducted with operational managers as they ran the simulation to gain insights into the relevance of their current practices related to the use of production and financial information at each stage of the internal supply chain. Discussions were also conducted with corporate management to ascertain their perceptions of the degree of shared goals and visions between both levels of management. The results of the action research component of the study are discussed in the next section.

4.3 Outcomes

The examination of ACGC's management accounting information as provided to operational managers, insights gained from the business simulation exercise and discussions with both corporate management and operational managers, indicated a number of reasons behind the disconnect between operational and corporate goals, namely:

1. While the relationships between the internal supply chain components of the company (Breeding, Backgrounding and Finishing properties) are well established and understood throughout the company, performance information available from management accounting reports is rarely set up in a format that clearly conveys the relationships between property level operational activities and corporate performance.
2. The isolation and autonomous nature of beef production properties presents additional stressors which get reflected in an individual business unit focus by property managers rather than an overall corporate approach. Additionally, transfer pricing is leading to a property-centric approach to internal supply chain issues by property managers: these can be misleading when the accounts of a single enterprise are considered in isolation rather than

for the organisation as a whole (Elliot and Elliot, 2001). They can have an inflationary effect on costs at each stage of the internal supply chain because the costs associated with production at one property in the chain are transferred through to the next property as component of the 'price' paid by that next station. Property managers thus attempt to maximise their revenues at each stage to cover these assigned costs. Table 3 provides a summary output from the business simulation model showing that transfer pricing inflates the costs of production across the internal supply chain compared to the actual costs of production incurred by the company.

3. Overall company performance is assessed by shareholders using metrics covering a number of areas including profitability, liquidity, financial stability, cash flow and cash sufficiency – i.e. corporate management is judged on how well they have pulled these issues together to maximise the market value of owners' equity. While these metrics are the focus of shareholders and corporate managers, operational managers are detached from them because internal management accounting measures such as transfer pricing are used to monitor individual property performance.
4. As a result, the different performance measures used for corporate and operational management results in an incongruence of goals between the two different components of the company. In general, the type of goal incongruence between higher corporate management and individual property managers as identified by the ACGC corporate management is not uncommon, but certainly provides a complex management challenge when striving for improved investor returns (Frow, Marginson & Ogden 2005).
5. While the property managers are highly skilled in operational aspects of running cattle grazing enterprises, they rarely have the knowledge or skills in classic business technologies such as commerce and accounting that their equivalent urban-based divisional managers have. Therefore, they are often not proficient in analysing and utilising corporate management accounting information to support their decision making activities. This lack of knowledge and understanding of key financial performance indicators has been identified by senior management as an area where skills need to be upgraded in order improve overall corporate performance

Table 3 a & b. Final summary output from the business simulation model exercise under different climatic scenarios – note how production costs are inflated across the internal supply chain components compared to the actual costs of production incurred by the company.

3a. Normal season

Breeding		**Backgrounding**		**Finishing**		**Enterprise**	
Head produced	*14875*	*Head produced*	*14,875*	*Head produced*	*15,000*	*Head produced*	*15,000*
Transfer Income	$ 4,172,438	Transfer income	$ 9,591,400	Sale Income	$16,422,525	Sale Income	$ 16,422,525
Costs of Production	**$ 1,338,750**	**Costs of Production**	**$ 7,325,938**	**Costs of Production**	**$11,925,775**	**Costs of Production**	**$ 6,307,250**
Profit	$ 2,833,688	Profit	$ 2,265,463	Profit	$ 4,496,750	Profit	$ 10,115,275
Income per head	$ 281	Income per head	$ 645	Income per head	$ 1,094.84		
Cost per head	$ 90	Cost per head	$ 311	Cost per head	$ 795.05	Total Assets	$101,623,750
Profit per head	$ 191	Profit per head	$ 334	Profit per head	$ 299.78	Return on Total Assets	9.95%
Total Asset Value	$39,783,750	Total Asset Value	$29,940,000	Total Asset Value	$31,900,000		
						Revenue per KG	**$ 2.10**
						Overall cost per kg	**$ 0.81**
						Profit per kg	**$ 1.29**

3b. Drought conditions

Breeding		**Backgrounding**		**Finishing**		**Enterprise**	
Head produced	*8000*	*Head produced*	*8,000*	*Head produced*	*10,000*	*Head produced*	*10,000*
Transfer Income	$ 2,000,000	Transfer income	$ 5,708,800	Sale Income	$11,146,800	Sale Income	$ 11,146,800
Costs of Production	**$ 2,415,001**	**Costs of Production**	**$ 4,268,001**	**Costs of Production**	**$10,778,800**	**Costs of Production**	**$ 7,803,001**
Profit	-$ 415,001	Profit	$ 1,440,800	Profit	$ 368,000	Profit	$ 3,343,799
Income per head	$ 250	Income per head	$ 714	Income per head	$ 1,114.68		
Cost per head	$ 302	Cost per head	$ 280	Cost per head	$ 1,077.88	Total Assets	$101,623,750
Profit per head	-$ 52	Profit per head	$ 434	Profit per head	$ 36.80	Return on Total Assets	3.29%
Total Asset Value	$39,783,750	Total Asset Value	$29,940,000	Total Asset Value	$31,900,000		
						Revenue per KG	**$ 2.10**
						Overall cost per kg	**$ 1.47**
						Profit per kg	**$ 0.63**

These results were not wholly unexpected given the work of Lee and Amaral (2002), Harrison and Godsell (2003), Griffis et al., (2004) and Melnyk et al., (2004) but they do support the need for a tailored performance measurement system providing *operational* business unit performance metrics across the internal supply chain that address *overall* corporate goals to guide current and future activities. In particular, the analysis showed that any performance metrics used by corporate management in ACGC need to be practically based and feasible for property managers if they are to assess their performance in the context of overall company performance.

5. ACGC's Tailored Performance Measurement System

The analyses outcomes show that the financial information used traditionally in the company for measuring performance was not fostering the required alignment of operational and corporate goals, and thus an alternative information framework was needed to facilitate the collection and dissemination of information that could be used for this purpose.

Developing a tailored performance measurement system for such a vertically integrated agribusiness is complex. As Griffis et al., (2004) indicate, it should also be viewed from the perspective that the company, while working under standard corporate governance guidelines requirements to deliver the best return on investment (ROI) possible to public shareholders, has a unique business environment in which to deliver such an ROI. The uniqueness of the operating environment is related to the fact that the company deals in a self regenerating asset – livestock in this instance. While there are numerous publications about farm management and farm accounting (Sturrock, 1982; Smith, 1987; Kay and Edwards, 1999; Obst et al., 1999; Barry et al., 2000) there has been virtually no supply chain performance measurement research associated with the internal supply chains of large multi-enterprise agribusinesses or innovative performance measurement systems for self regenerating assets in livestock farming (Argiles and Slof 2001). In fact, most performance measurement research - whether it be in functional business metrics or in inter-business metrics - has been undertaken in the manufacturing sector where production is highly structured and is often automated (Hongren, Foster and Datar 1999). Only recently (Aramyan et al., 2005) has any specialised attention been given to performance measurement in agri-food chains – and then this was based in the horticulture sector and driven by customer satisfaction requirements.

The following two subsections describe two areas of interest in developing a tailored performance measurement system for ACGC before the establishment of specific key indicators of performance and associated metrics for ACGC are discussed.

5.1 Self regenerating livestock assets

The production of self regenerating livestock assets have some unique challenges in comparison to manufacturing when developing a performance measurement system. For example, in the manufacturing sector, the internal supply chain of a manufacturing organisation will almost certainly be geographically co-located to ensure economies of scale and logistics, and the prediction and tracking of the costs and time spent on individual production units is relatively straight forward. In most cases, material prices and labour costs are contracted for set periods of time adding some certainty to expected costs.

However, in the internal supply chain of a large geographically dispersed livestock production organisation, while the costs of production relating to wages are relatively stable and easily tracked, it is much more difficult to predict the impacts on production costs of climatic variability experienced by components of the internal supply chain that maybe thousands of kilometres apart. For example, in ACGC, livestock breeding properties are concentrated in the northern parts of the country due to the large scale property sizes needed, while backgrounding and finishing properties are concentrated in the central and eastern regions of the country due to more productive land and easier access to processing facilities and markets.

The practical issue for performance management and measurement associated with geographic dispersion of internal supply chain components and associated climatic variability, is that what happens to one property has implication for all stages of the internal supply chain. For example, variable rainfall in particular plays a major role in determining production: a drought on a major breeding property will not only reduce production on that property, but will also reduce the product flow on to the backgrounding and finishing components of the internal supply chain. This set of circumstances then creates the requirement to purchase additional stock to make up the shortfall which adds to production costs and reduces profit margins. Drought will also add significant costs in terms of supplementary feeding, (which itself can be difficult to budget for as the price will vary quickly depending on the prevailing seasonal conditions for feed producers), and will quite possibly require stock to be transferred to other properties experiencing better climate to ensure their survival - but adding additional transport costs within the internal supply chain.

The impacts of these issues can easily be compounded by the management decisions made by individual property managers if they do not fully consider the impact of their actions on other members of the internal supply chain. As a consequence it is critical to ensure that all property managers are aware of the impacts of their decisions on other properties within the internal supply

chain so that they are working as an integrated organisation rather than on an individual basis. It is thus also important that any performance measurement system developed should be designed to facilitate an integrated approach across the internal supply chain based on operational activities that can be seen to achieve corporate goals.

5.2 Establishing Key Performance Indicators for the ACGC internal supply chain

Given that the levels of decision making are different in various components of ACGC (corporate versus operational), effective performance measurement criteria should, according to (Malina and Selto, 2004 p. 442): reflect these differences and enable:

- The viewing of an organization from different perspectives:
- Adopting a balance of different ways of measuring:
- Setting quantified, measurable goals.

In developing a framework for performance measurement in ACGC's internal supply chain, key performance indicators (KPIs) and associated metrics were developed based on the logical operational relationships between the components of the internal supply chain – that is, the relationships between the Breeding, Backgrounding and Finishing properties - and the integrative nature of these types of relationships. As such, the KPIs and metrics in this case needed to be developed within the context of how the activities of one component of the internal supply chain impact on other components.

Implicit in this process in a self regenerating asset based on livestock, are the issues of animal welfare and sustainable land management which set limits on the scale of production and thus possible revenues (Slaughter, 2002). As such KPIs must be underpinned by flexible budgeting to allow for production and seasonal variation and land capability.

The KPIs chosen include breeding performance, cattle transfers in and out, cattle purchases, cattle sales and production performance as well as corporate performance. Table 4 sets out the proposed set of KPIs and the underlying metrics for the internal supply chain of ACGC, and shows how the proposed KPIs 'cascade' across the internal supply chain. For example, breeding performance impacts on transfers to backgrounding in terms of numbers of animals. This in turn impacts on the number of purchases that need to be made to allow backgrounders to operate at optimal capacity given seasonal conditions. Transfers to finishers are then dependant on the numbers of stock backgrounded and as such impact on the numbers of cattle the finisher needs to purchase so that they in turn can operate at an optimal capacity. If the reader follows the cascading KPIs, as depicted by the arrows shown in Table 4, it can be seen that by providing quantifiable, balanced measures

that allow property managers to put in context the impact of their decisions on overall corporate performance, the emphasis is removed from transfer pricing and placed it on the impacts of operational activities on overall company performance.

Table 4. Proposed KPIs and associated metrics for ACGC. Example data is used to demonstrate the cascade effect associated with proposed KPIs and associated metrics. In practice, budgeted figures will be based on historical performance and variances in production will be driven by seasonal conditions.

	Property 1 (Breeder)			Property 2 (Backgrounder)			Property 3 (Finisher)			Overall		
Kgs expressed in liveweight	**Actual**	**Budget**	**Variance**	**Actual**	**Budget**	**Variance**	**Actual**	**Budget**	**Variance**	**Actual**	**Budget**	**Variance**
Breeding Performance (KPI 1)												
Branding Numbers	4,667	6,000	(1,333)	2,000	12,000	(10,000)	1,000	9,000	(8,000)	7,667	27,000	(19,333)
Branding Percentage	0.60	0.75	(0.15)	0.65	0.80	(0.15)	0.63	0.75	(0.12)	0.63	0.77	(0.14)
Cattle Transferred Out (KPI 2)												
Number of cattle transferred out	**5,000**	7,000	(2,000)	7,000	10,000	(3,000)						
Average weight of cattle transferred out	310	300	10	470	450	20						
Average income per kg of cattle transferred out	1.85	2.00	(0.15)	2.05	2.20	(0.15)						
Total Income from cattle transferred out	2,867,500	4,200,000	(1,332,500.0)	6,744,500	9,900,000	(3,155,500)						
Cattle Transferred In (KPI 3)												
Number of cattle transferred in	-	-	-	**5,000**	7,000	(2,000)	**7,000**	**10,000**	(3,000)			
Average weight of cattle transferred in	-	-	-	310	300	10	470	450	20			
Average cost of per kg of cattle transferred in	-	-	-	1.85	2.00	(0.15)	2.05	2.20	(0.15)			
Total cost of cattle transferred in	-	-	-	2,867,500	4,200,000	(1,332,500)	6,744,500	9,900,000	(3,155,500)			
Cattle Purchases (KPI 4)												
Number of cattle purchased	-	-	-	**2,000**	3,000	(1,000)	**3,000**	1,000	2,000	**5,000**	4,000	1,000
Average weight of cattle purchased	-	-	-	300	300		470	470		402	343	60
Average cost per kg of cattle purchased	-	-	-	1.90	1.80	0.10	2.00	1.90	0.10	1.97	1.83	0.14
total cost of cattle purchased	-	-	-	1,140,000	1,620,000	(480,000)	2,820,000	893,000	1,927,000	3,960,000	2,513,000	1,447,000
Cattle Sales (KPI 5)												
Number of cattle sold	-	-	-	-	-	-	10,000	10,000	-	**10,000**	10,000	-
Average weight of cattle sold	-	-	-	-	-	-	640	630	10	640	630	10
Income per kg of cattle sold	-	-	-	-	-	-	2	2	0	2	2	0
total income from cattle sold	-	-	-	-	-	-	13,120,000	12,600,000	-	**13,120,000**	12,600,000	520,000
Production Performance (KPI 6)												
Average number of kgs gained per beast	200	200	-	200	200	-	200	200	-	600	600	-
Average number of days cattle kept on property	200	200	-	200	200	-	100	100	-	500	500	-
Average Kgs gained per beast per day	1.00	1.00	1.80	1.80	1.80	-	2.50	2.50	-	1.77	1.80	(0.03)
Variable cost per Kg gained	0.40	0.35	0.30	0.30	-	0.30	0.50	0.50	-	1.20	1.20	-
Contribution margin per kg produced	1.45	1.65	(0.20)	60.00	-	(0.45)	(0.50)	(0.50)	-	0.85	0.80	0.05
Total costs of production	1,003,625	1,617,000	(613,375)	1,888,460	3,811,500	(1,923,040)	3,673,600	3,528,000	145,600	**6,565,685**	8,956,500.00	(2,390,815)
Mortality percentage	1.00%	1.50%	-0.50%	0.50%	1.00%	-0.50%	0.25%	0.50%	-0.75%	0.57%	0.50%	0.07%
Corporate Performance (KPI 7)												
ROI	5.80%	6.00%	-0.20%	6.10%	5.00%	1.10%	7.00%	8.00%	-1.00%	**6.30%**	**7.00%**	**-0.70%**
Operating Expenses	1,433,750	2,310,000	(876,250)	2,697,800	5,445,000	(2,747,200)	5,248,000	5,040,000	208,000	**9,379,550**	**7,560,000**	**312,000**
EBIT										**3,740,450**	**2,527,000**	**(1,239,000)**

This type of framework shows that an internal supply chain of a multi-enterprise organisation displays different characteristics to a whole of industry chain. In traditional industry supply chains the final component of the chain (e.g. the retail component) dictates volume requirements to meet demand i.e. a *product pull* situation (Beamon, 1998; Beamon and Bermudo, 2000; Cox, 1999; 2001). However, in the case of the internal supply chain the final component, eg the finisher in the case of ACGC, must still meet volume requirements for its markets, but it is in fact the first component, the breeder, which dictates purchasing strategies and tactics by their capacity to supply cattle into the internal supply chain (i.e. *product push*).

As a consequence of this internal supply chain power dynamic, a fundamental role of the proposed KPIs must be to focus the attention of property managers on the whole internal supply chain process rather than maximising individual property performance. Therefore embedded in the evaluation process is the need for a tailored system that rewards performance that relates to good management. While good performance outcomes should be rewarded, both good and poor performance outcomes should be examined in context of factors such as seasonal conditions. In both cases any required responses should be developed in consultation with property managers so that they have ownership of the strategies and tactics to be employed.

5.3 Integration of ACGC Internal Supply Chain goals and the BSC Framework

A key part of achieving good performance across the internal supply chain and the development of core competencies in this area is an inbuilt reflectiveness of actions taken, and the ability to analyse the impacts of those actions (OECD, 2005, Gray, 2007). To this end, in addition to the metrics involved, it was proposed that property managers should be required to report on variances against budgeted measures as well as their understanding of the underlying factors affecting their performance outcomes (e.g. seasonal conditions). Such reporting requires managers to reflect on the impacts that their management decisions have on their own production issues but also on the wider impacts of these decisions and associated variances on the efficiency of the internal supply chain and subsequently the effects on overall corporate performance in relation to such factors.

This approach compels property managers to focus primarily on *tactical* management issues they have control and ownership over. Corporate management can then be in a position to effectively evaluate operational management performance as it aligns with *strategic* corporate goals and to provide constructive feedback. The approach also encourages property managers to focus on factors that influence the designated KPIs and associated metrics (in the context of seasonal and market conditions), thus aligning production goals with corporate goals. This results in the performance of

each stage of the internal supply chain being measured in relation to its contribution to overall corporate performance. As such 'balance' is created between measures of production performance within the internal supply chain and corporate performance resulting in an 'Internal Supply Chain Balanced Scorecard' (ISCBSC) (Fig. 5) which can be refined and adjusted as needed.

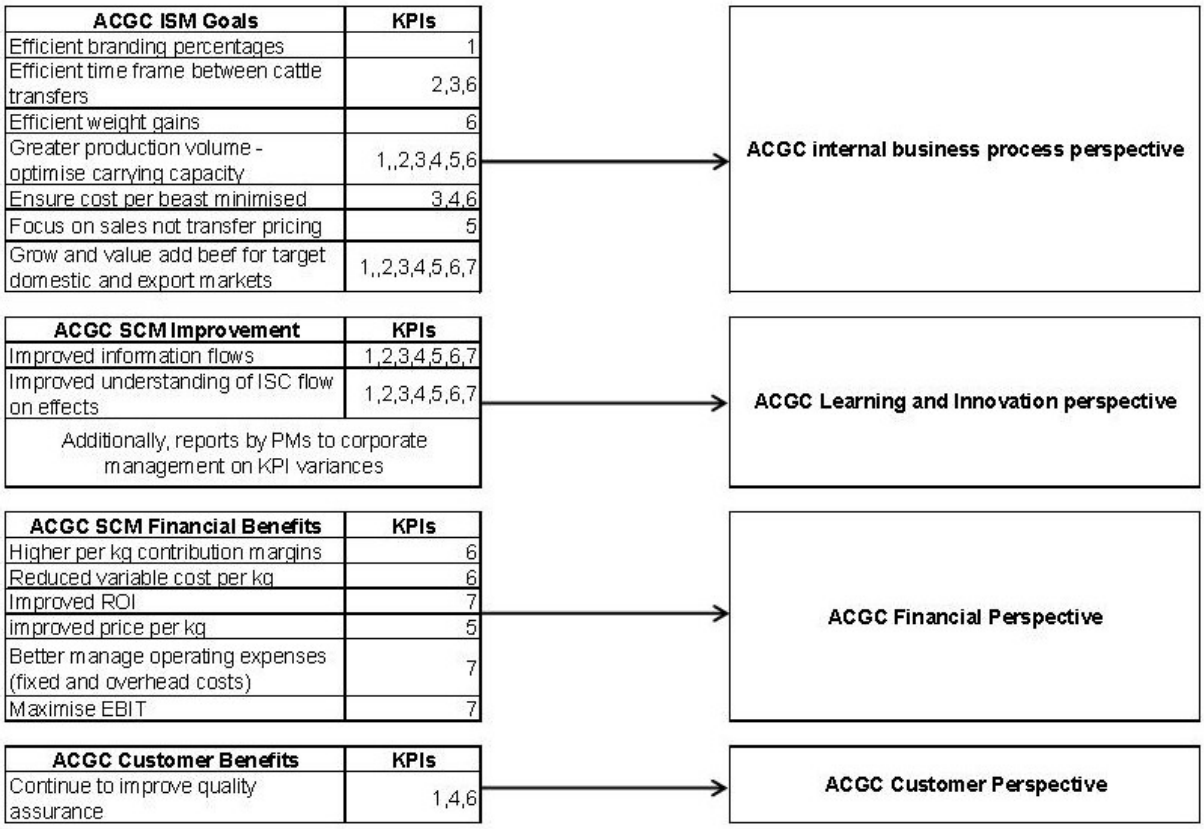

Fig. 5. An example of an Internal Supply Chain Balanced Scorecard for a multi-enterprise beef production company showing the relationship between the internal supply chain and the balanced scorecard framework [KPI numbers taken from Table 4].

While this approach does not do away with the need for the existing cattle trading account and profit and loss summary which are required for reporting purposes (Tables 1 and 2), it presents data and information in a way that is more consistent with the day to day activities of property managers making it easier for them to relate to and make use of. Linking operational activities to corporate objectives in this way provides a bridge between the different skills and focus of operational and corporate managers and as such assists in building goal congruence (Fig. 6). Operational managers are measured on KPIs that encourage them to focus on areas that will improve overall performance of the company, rather than on individual property performance which can reduce overall company

performance. In addition, the use of targeted KPIs and associated metrics supports the operational skills of property managers which allows them to more effectively contribute to corporate goals.

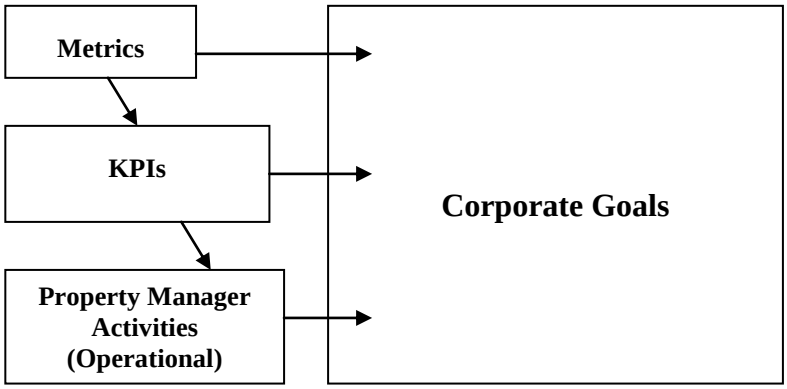

Fig. 6. Shows conceptual links between operational activities and corporate goals**.**

6. Discussion and Conclusions

Creating a tightly integrated and cohesive supply chain is regarded as a value creation mechanism for a business – the more tightly the chain is integrated, the more cohesive it is and the greater the value created (Tan et al., 2002; Bourguignon et al., 2003; Cayla, 2006). Thus if goal incongruence (when individuals or groups within an entity may have only partly overlapping goals) amongst components of the supply chain develops, a risk to supply chain integration and thus to value creation for the business ensues (Foss and Christensen, 1996). This case study has demonstrated that such goal incongruence can easily develop even in well managed supply chains if and when there are significantly divergent management issues associated with the operational and corporate arenas of a business - and when the reporting information used as performance metrics do not address these differences.

Given the often divergent management issues of operational and corporate management in companies such as ACGC, goal incongruence will always be a potential issue and should be continually assessed.

This case study has shown that appropriate performance indicators and measures can be created that relate directly to logical operational outcomes thus encouraging a more tightly integrated internal supply chain, a stronger coherence among the components and a better aligned set of operational

and corporate goals. Moreover, the study showed that these performance indicators and measures can be created from company accounting systems despite these systems being fundamentally functionally based. Additionally the study has shown that a hybrid balanced scorecard framework can be used as a basis to develop indicators and associated metrics to facilitate more efficient management of the internal supply chain of a multi-enterprise business, and to thus better integrate the goals and activities of the autonomous business units.

Implicit to this approach is the idea that while business units within the internal supply chain remain autonomous, key areas where integrated approaches are required can be strategically managed to promote the coherence of goals at all levels within the organisation. A concept that covers such a situation is that of 'Integrated Autonomy' (IA) which originally comes from the Distributed Computing Systems literature where it is defined as:

"*a paradoxical state where two or more agents within a distributed system transcend their individual identities (autonomy) to combine with other agents in the system to amplify their individual strengths, while at the same time enabling synergies associated with operating as an integrated whole, to create additional overall benefits to the system*" (Zhang, et al., 2003).

In supply chain management terms, IA could be developed as a strategy which would aim for a level of autonomy and expertise within each component of the internal chain but at the same time would promote the integration of key functions and processes across other components. As such, an IA strategy would create a multiplier effect of component expertise in order to achieve the broader strategic goals of the whole company/chain. I.e. a sum of the parts is greater than the individual components.

In this study it has also been demonstrated that it is critical that the data stored in accounting systems for autonomous components, be adequate to fulfil the information needs of a holistic whole-of-company performance measurement system. This is particularly the case in a BSC because both financial and non-financial data (Griffis et al., 2004) are needed to encompass both operational and corporate perspectives.

Finally, this study has demonstrated that performance measures based on logical relationships between internal supply chain components does, as Norreklit (2000) and Plummer and Rolfe (2002) suggest, facilitate the development of coherence between components of the internal supply chain and the development of synergies between corporate and operational goals. The main reason for this is that measures based on these types of relationships ensure that there is common understanding

across the internal supply chain of the information used and the implications of decisions made with it on other components of the chain (Tan et al., 2002; Verdiccio and Colombetti, 2002; Griffis et al., 2004).

Practically, the proposed performance indicators and metrics for assessing the company's internal supply chain were presented to ACGC senior management. The proposed measurement system was accepted and implementation of it has since been progressively undertaken within normal company reporting timelines (reporting is required monthly). Follow-up discussions with senior executives have indicated that that goal incongruence between the operational and corporate areas of the business diminished rapidly as a direct result of the new information and reporting requirements.

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References

Abernethy, M.A., Bouwens, J., van Lent, L. (2003), *Determinants of Control System Design in Divisionalised Firms,* Department of Accounting and Business Information Systems, Research Paper Series, University of Melbourne.

Aramyan, L., Lansink, A.O., van Kooten, O. (2005), "Testing a performance measurement framework for agri-food chains", *Proceedings of the 15th IFMA Congress*, Campinas, Spain, pp. 86-97.

Argiles, J.M., Slof, E.J. (2001), "New opportunities for farm accounting", *The European Accounting Review*, Vol. 10 No. 2, pp. 361 -383.

Barry, P.J., Ellinger, P.N., Hopkin, J.A., Baker, C.B. (2000), *Financial Management in Agriculture*, Interstate Publishers, Danville Ill USA.

Beamon, B. (1998), "Supply chain design and analysis: models and methods", *International Journal of Production Economics*, Vol. 55 No. 3, pp. 282-294.

Beamon, B. (1999), "Measuring supply chain performance", *International Journal of Operations & Production Management*, Vol. 19 No. 3, pp. 275-292.

Beamon, B.M., Bermudo, J.M. (2000), "A hybrid push/pull control algorithm for multistage, multiline production systems", *Production, Planning & Control*, Vol. 1 No. 4, pp. 349-356.

Boehlje, M.(1999), "Structural changes in the agricultural industries: how do we measure, analyze and understand them?", *American Journal of Agricultural Economics*, Vol. 81 No. 5, pp. 10-28.

Brewer, P. (2002), "Aligning supply chain incentives using the balanced scorecard", *Supply Chain Forum* Vol. 3 No. 1, pp. 41-45.

Brewer, P., Speh, T. (2001), "Adapting the balanced scorecard to stimulate collaborative supply chain behaviour", *Supply Chain Management Review*, March/April, pp. 48-57.

Brewer, P., Speh, T. (2000), "Using the balanced scorecard to measure supply chain performance", *Journal of Business Logistics* Vol. 21 No. 1, pp. 75-93.

Bryceson, K.P., Kandampully, J. (2004), "The Balancing Act: 'E' issues in the australian agri-industry sector", In: *Proceedings of the McMaster World Congress on The Management of Electronic Business*, 14-16 January, Hamilton, Ontario.

Bryceson, K. P. (2006), *E Issues in Agribusiness – The What, Why, How*. CABI International, Wallingford, UK.

Caplice, C.,Sheffi, Y. (1995), "A review and evaluation of logistics performance measurement systems", *The International Journal of Logistics Management*, Vol. 6 No. 1, pp. 61-74.

Cayla, D. (2006), "Ex post and ex ante coordination: Principles of coherence in organisations and markets", *Journal of Economic Issues* Vol. 40 No. 2, pp. 325-332.

Chan, F.T.S., Qi, H.J. (2003a), "An innovative performance measurement method for supply chain management", *Supply Chain Management: An International Journal*, Vol. 8 No.3, pp.209-23.

Chan, F.T.S., Qi, H.J. (2003b), "Feasibility of performance measurement system for supply chain: a process-based approach and measures", *Integrated Manufacturing Systems*, Vol. 14 No.3, pp.179-90.

Chan, F.T.S., Qi, H.J., Chan, H.K., Lau, H.C.W., Ip, R.W.L. (2003), "A conceptual model of performance measurement for supply chains", *Management Decision*, Vol. 41 No.7, pp.635-42

Christie, A.A. Joye, M.P., Watts R.L. (2003) "Decentralization of the firm: theory and evidence"' *Journal of Corporate Finance* Vol. 9, pp. 3-36.

Cooper, R., Kaplan, R. (1992) "From ABC to ABM", *Management Accounting (US)*, Vol. 74, pp. 54-57.

Cox, A. (1999) "Power, value and supply chain management", *Supply Chain Management*, Vol. 4 No. 4, pp. 167-175.
Cox, A. (2001), "Managing with Power: Strategies for improving value appropriation from supply relationships*", Supply Chain Management*, Vol. 37 No. 2, pp. 42-47.
Davis, S., Albright, T. (2004), "An investigation of the effect of balanced scorecard implementation on financial performance", *Management Accounting Research*, Vol.15 No. 2, pp.135-153.
Dunne, A.J. (2001), "Supply chain management: fad, panacea or opportunity?"' *Occasional Paper* Vol. 8 No. 2, pp. 1-40. School of Natural and Rural Systems Management, The University of Queensland, Queensland, Australia.
Elliot, B., Elliot, J. (2001), *Financial Accounting and Reporting*, 5th Edition, Prentice Hall, UK.
Fisher, J. (1994), "Technological Interdependence, labor production functions and control systems", *Accounting Organisations and Society* Vol. 19 No. 6, pp. 493-505.
Foss, N.J., Christensen, J.F. (1996), "A Process Approach to Corporate Coherence", Available at Social Science Research Network (SSRN): http://ssrn.com/abstract=70888 or DOI: 10.2139/ssrn.70888.
Frow, N., Marginson, D., Ogden, S. (2005), "Encouraging strategic behaviour while maintaining management control: Multi-functional project teams, budgets, and the negotiation of shared accountabilities in contemporary enterprises", *Management Accounting Research* Vol. 16 pp. 269–292.
GAO (no date), "US Government Accounting Office", Sourced: http://www.gao.gov/ Accessed August 1, 2006.
Gavious, A. (1999), "Transfer Pricing Under Capacity Constraints", *Journal of Accounting, Auditing and Finance*, Vol. 14 No. 1, pp. 57-72.
Govindarajan, V., Gupta, A.K. (1985), "Linking control systems to business unit strategy: Impact on performance", *Accounting, Organizations and Society*, Vol. 10 No. 1, pp. 51-66.
Gray, D.E. (2007) Facilitating Management Learning: Developing Critical Reflection through Reflective Tools. *Management Learning*, Vol. 38 No. 5, pp. 495-517.
Griffis, S.E., Cooper, M., Goldsby, T.J., Gloss, D.J. (2004), "Performance measurement: measure selection based upon firm goals and information reporting needs", *Journal of Business Logistics*, Vol, 25 No. 2, pp. 165-184.
Harrison, A., Godsell, J. (2003), "Customer responsive supply chains: an exploratory study of performance measurement", *Cranfield University Working Paper Series*. SWP 1/03, UK.
Hausman, W.H. (2002), "Supply chain performance metrics". In: Billington, C., Harrison, T., Lee, H., Neale, J. (Eds), *The Practice of Supply Chain Management*. Kluwer, Boston, USA.
Hongren, C.T., Foster, G., Datar S.M. (1999), *Cost Accounting a Managerial Emphasis*. Prentice Hall, New Jersey, USA.
Huin S.F.; Luong L.H.S.; Abhary K. (2002), "Internal supply chain planning determinants in small & medium sized manufacturers", *International Journal of Physical Distribution & Logistics Management*, Vol. 32 No. 9, pp. 771-782.
Kaplan, R., Norton, D. (1992), "The balanced scorecard: measures that drive performance", *Harvard Business Review*, Vol. 70 No. 1, pp. 71-79.
Kaplan, R., Norton, D. (1993), "Putting the balanced scorecard to work", *Harvard Business Review*, Vol. 71 No. 5, pp. 134-147.
Kay, R., Edwards W.M. (1999), *Farm Management* 4th Edition. McGraw Hill, Boston, USA.
Kiefer, A.W., Novak, R.A. (1998), "An empirical analysis of warehouse management systems in the context of supply chain implementation", *Transportation Journal Spring*, pp. 18-27.
Krajewski. L., Ritzman L. (1993) *Operations Management: Strategy and Analysis*, Addison Wesley, Boston, USA.
Langfield-Smith, K., Thorne, H., Hilton, R. W. (2003), *Management Accounting: An Australian Perspective*, 3rd Edition. McGraw-Hill, Sydney, Australia.

Lee, H.L., Amaral J. (2002), "Continuous and Sustainable improvement through supply chain performance management", *Stanford Global Supply Chain Management Forum Paper* SGSCMF – W1- 2002.

Malina, M.A., Selto, F.H. (2004), "Choice and change of measures in performance measurement models", *Management Accounting Research*, Vol. 15 No. 4, pp. 441-469.

Martyn, W.F. (1997), *Financial Management for Farmers and Rural Managers*, Blackwell Science, Malden, USA.

Melnyk, S.A, Stewart, D.M., Swink, M. (2004), "Metrics and performance measurement in operations management: dealing with the metrics maze", *Journal of Operations Management*, Vol. 22, pp. 209-217.

Mentzer, J. T. (2004), *Fundementals of Supply Chain Management. Twelve Drivers of Competitive Advantage*. Ch 4. pp 65-87. SAGE Publications Inc.

Merchant, K., Van der Stede W. (2003), *Management Control Systems: Performance Measurement Evaluation and Incentives*, Prentice Hall, New Jersey, USA.

Neely, A., Mills, J., Platts, K., Richards, H., Gregory, M., Bourne, M., Kennerly, M. (2000), "Performance measurement system design: developing and testing a process-based approach", *International Journal of Operations & Production Management*, Vol. 20 No. 10, pp. 1119-1145.

Neely, A., Gregory, M., Platts, K. (2005), "Performance Measurement System Design"' *International Journal of Operations & Production Management*, Vol 25 No. 12, pp. 1228-1263.

Norreklit, H. (2000), "The balance on the balanced scorecard a critical analysis of some of its assumptions", *Management Accounting Research*, Vol. 11 No. 1, pp. 65-88.

Obst, W., Graham, R., Binney, W., Christie, G. (1999), *Agribusiness Financial Management*. The Federation Press, Sydney, Australia.

OECD, (2005), Definition and Selection of Key Competencies: Executive Summary. Sourced from http://www.oecd.org/dataoecd/47/61/35070367.pdf. Accessed Aug 22 2006.

O'Keeffe, M. (1998), "Establishing supply chain partnerships: lessons from australian agribusiness", *Supply Chain Management*, Vol. 3 No. 1, pp. 5-9.

Otley, D. (1999), "Performance management: a framework for management control systems research. *Management Accounting Research*, Vol. 10, pp. 363-382.

Plummer, K., Rolfe, D. (2002), "A balanced scorecard for agricultural co-operatives: An Introduction", A poster presentation to the 16th Australian and New Zealand Academy of Management (ANZAM) Conference: Enhancing Business and Government Accountability, 4-7 December, Beechworth, Australia.

Porter, M.E. (1985), *Competitive Advantage, Creating and Sustaining Superior Performance*. The Free Press, New York, USA.

Power, D. (2005), "Supply chain management integration and implementation: a literature review", *Supply Chain Management-An International Journal*, Vol. 10, pp.252-63.

Reisinger, H., Cravens, K.S., Tell, N. (2003), "Prioritizing performance measures within the balanced scorecard framework", *Management International Review*, Vol. 43 No.4, pp.429-38

Sabri, E. H., Beamon B.M. (2000), "A multi-objective approach to simultaneous strategic and operational planning in supply chain design", *OMEGA*, Vol. 28 No. 5, pp. 581-598.

Scott, T.W., Tiessen, P. (1999), "Performance measurement and managerial teams", *Accounting, Organizations and Society*, Vol. 24 No. 3, pp. 263-285.

Shah, J. and Singh, N. (2001), "Benchmarking internal supply chain performance: development of a framework", *The Journal of Supply Chain Management*, Winter pp. 37-47

Simons, R. (2000.), *Performance measurement and control systems for implementing strategy: Text & Cases*. Prentice Hall, New Jersey, USA.

Simons, R. (2005) *Levers of Organization Design: How Managers Use Accountability Systems for Greater Performance and Commitment*. Harvard Business School Press, Boston, USA.

Slaughter, G.J. (2002), The Relationship between viable financial performance and sustainable land management practices on grazing enterprises in the eastern Mulgalands of South West Queensland. *Ph D Thesis*, University of Queensland, Australia.

Smith, E. (1987), *Managing the Farm: Business Methods for Farmers*. Nelson Publishing, Melbourne, Australia.

Sturrock, F. (1982), Farm *Accounting and Management* 7th Edition. Marshfield Press, London UK.

Swamidass, P.M., Baines, T. and Darlow, N. (2001), "The role of manufacturing and marketing managers in strategy development: Lessons from three companies", *International Journal of Operations & Production Management*, Vol. 21 No. 7, pp. 933-948.

Swaminathan, J. M., S. F. Smith, and N. M. Sadeh (1998), "Modeling supply chain dynamics: a multiagent approach", *Decision Sciences*, Vol. 29, No. 30**,** pp. 607-632,

Tan, K.C. (2002), "Supply chain management: practices, concerns and performance issues", *Journal of Supply Chain Management*, Vol. 38, pp. 42-53.

Tan K-C, V., Kannan, R., Handfiled, R.B., Ghosh, S. (1999), "Supply chain management: an empirical study of its impact on performance", *International Journal of Production and Operations Management*, Vol, 19 No. 10, pp. 1034-1052.

Theeranuphattana, A. and Tang, J.C. (2008), "A conceptual model of performance measurement for supply chains: alternate considerations", *Journal of Manufacturing Technology Management*, Vol. 19 No. 1, pp. 125-148.

Van Helden, J.G., van der Meer-Kooistra, J., Scapens, R.W. (2001), "Co-Ordination of internal transactions at Hoogovens steel: struggling with the tension between performance-oriented business units and the concept of an integrated company", *Management Accounting Research*, Vol. 12, pp. 357-386.

Verdicchio, M., Colombetti, M. (2002), "Commitments for agent-based supply chain management", *ACM SIGecom Exchanges*, Vol. 3 No. 1, pp. 13-23.

Vickery, S.K., Jayaram, J., Droge, C., Calantone, R. (2003), "The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships", *Journal of Operations Management*, Vol. 21, pp. 523-539.

Vereeke, A. and Muylle, S. (2006), "Performance improvement through supply chain collaboration in Europe", *International Journal of Operations & Production Management*, Vol. 26 No. 11, pp. 1176-1198.

Yin, R. (1994). "*Case Study Research. Design and Methods*". 2nd Edition. Sage Publications, Thousand Oaks, USA.

Zhang, Z., McCalley, J., Vishwanthan, V. and V. Honavar (2003), "Multiagent Systems Solutions for distributed computing, communications, and data integration needs in the Power Industry". *Power Engineering Society General Meeting, 14-17 July 2003, IEEE* Vol. 1, pp 44- 47.